

**EPA Superfund
Record of Decision:**

**ELLSWORTH AIR FORCE BASE
EPA ID: SD2571924644
OU 04
ELLSWORTH AFB, SD
06/07/1996**

Text:

Final Record of Decision for Remedial Action at Operable
Unit 4 Ellsworth Air Force Base, South Dakota

BASE UNITED STATES AIR FORCE AIR COMBAT COMMAND ELLSWORTH AIR FORCE

APRIL 1996

AF Project No. FXBM 94-7002

Final Record of Decision Operable Unit
4 Ellsworth Air
Force Base, South
Dakota

1.0 DECLARATION FOR THE RECORD OF DECISION (ROD)

1.1 SITE NAME AND LOCATION

Operable Unit 4 (OU-4), Landfill No. 3 Area, Ellsworth Air Base
(EAFB), National Priorities List Site. Meade and Pennington
Counties, South Dakota

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document describes EAFB's selected remedial action for
Operable Unit 4 (OU-4), in accordance with the Comprehensive
Environmental Response, Compensation, and Liability Act of 1980
(CERCLA), as amended by the Superfund Amendments and Reauthorization Act
of 1986 (SARA), and the National Oil and Hazardous Substances Pollution
Contingency Plan (NCP).

This decision is based on the contents of the Administrative Record for
OU-4, EAFB. The US Environmental Protection Agency (EPA) and the South
Dakota Department of Environment and Natural Resources (SDDENR) concur
with the selected remedial action.

1.3 ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from OU-4, if not
addressed by implementing the response action selected in this Record of
Decision (ROD), may present an imminent and substantial endangerment to
public health, welfare, or the environment.

1.4 DESCRIPTION OF SELECTED REMEDY

Twelve operable units (OUs), have been identified at EAFB. This ROD is for
a remedial action at OU-4 and is the sixth ROD for EAFB.

The selected alternative for the landfill, soil cover, includes the
following major components:

Institutional controls for the landfill area;

Placing a soil cover capable of sustaining perennial vegetation

over the landfill area;

Landfill gas monitoring and passive collection system, as necessary;

Long-term monitoring and maintenance.

The selected alternative for the ground water, pump and treat, includes the following major components:

Continued operation of the interim remedial action (IRA) which consists of removal and treatment of contaminated ground water; Installation of recovery trenches and/or additional extraction wells to be added to the

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existing IRA ground-water recovery system.

Treatment of removed ground water at the treatment plant built for the IRA.

Discharge of treated ground water to a surface water drainage, to the Base wastewater treatment plant, or by underground injection.

1.5 STATUTORY DETERMINATION

The selected remedy is protective of human health and the environment, complies with Federal and State of South Dakota requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable for OU-4. However, because treatment of the principal element. The size of the landfill and the fact that there are no apparent on-site hot spots that represent major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively. The remedy for ground water satisfies the statutory preference for treatment as a principal element.

Because this remedy will result in low levels of hazardous substances remaining on-site beneath the landfill cover area, a review will be conducted at least every five years after signing the ROD to ensure that the remedy continues to provide adequate protection of human health and the environment.

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1.6 SIGNATURE AND AGENCY CONCURRENCE ON THE REMEDY

BRETT M. DULA
General, USAF Vice Commander

Date Lieutenant

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1.6 SIGNATURE AND AGENCY CONCURRENCE ON THE REMEDY

consists of Landfill No.3 which is approximately 35-40 acres in size and is located in the southwestern corner of EAFB (Figure 2-3). The landfill was active between 1965 and 1976 as a trench and fill operation. The trenches were approximately 13 to 15 ft deep. One open trench was used for disposal of construction demolition debris during the mid-1980s. Digested wastewater treatment plant biomass was also added to the landfill at this time. A recent examination of 1946 and 1952 aerial photographs of EAFB indicated that some landfill activity may have occurred prior to 1965. Solid waste generated on-Base has been disposed of by contract at an off-Base sanitary landfill since 1976. Shop wastes (liquids and paints), industrial sewer sludge and oils, and miscellaneous refuse were placed in Landfill No. 3. During the mid-1970s, a gravel-filled waste-oil pit was operated in the southwest corner of the OU for about one year. The contents of approximately 100 55-gallon drums containing waste oil and fuel were placed in the waste-oil pit. Prior to 1982, the southwest corner of OU-4 was also used as a staging area for 55-gallon drums containing waste oil and fuel. Recently, the southwest corner of OU-4 was used to stage asphalt rubble. The asphalt rubble was removed in the fall of 1993. The exact locations of the waste pit and drum staging area are not known, but are presumably in the vicinity of the former asphalt waste pile area. During 1982 and 1983, OU-4 was used as a disposal site for soil containing Pramitol, a herbicide, and sodium chromate, a launch facility coolant.

The topography at OU-4 is fairly level, with a slight slope toward the south and east, and a few

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broad, shallow depressions. The western portion of the OU slopes gently toward the west. A series of east-west trending depressions are visible on aerial photographs, and are assumed to be the surface reflection of historical trench and fill operations.

A shallow aquifer has been identified at depths of 10 feet to 50 feet beneath the ground surface at EAFB. The top of the shallow aquifer at OU-4 varies seasonally, but is generally 14 ft to 32 ft below the ground surface. This ground water is classified as having a beneficial use as a drinking water supply suitable for human consumption (ARSD Chapter 74:03:15, Groundwater Quality Standards). The shallow aquifer may also discharge to the surface. However, no known seeps or springs were identified at OU-4.

Deeper bedrock aquifers also exist beneath EAFB. These deeper aquifers are separated from the shallow aquifer by 800 feet of low-permeability clays and silts. In the past, EAFB utilized these deeper aquifers for its water supply. Presently, EAFB obtains its potable water from the Rapid City Municipal Distribution System.

2.2.2 Regulatory Oversight Activities

Environmental investigation activities at EAFB were initiated by the Air Force in 1985 through an Installation Restoration Program (IRP) Phase I Installation Assessment/Records Search and Phase II, Confirmation/Quantification. The Phase I study, dated September, 1985, identified a total of 17 locations at EAFB where releases involving hazardous substances potentially occurred.

In Phase II of the IRP investigation, field activities included soil vapor surveys, geophysical surveys, surface and subsurface soil sampling, ground-water sampling, ground-water hydrologic testing, and ecological investigations.

On August 30, 1990 (55 Federal Register 35509), EAFB was listed on the U.S. EPA's National Priorities List (NPL). A Federal Facilities Agreement (FFA) was signed in January 1992 by the Air Force, EPA, and the State of South Dakota (State) and went into effect on April 1, 1992. The FFA establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions for EAFB in accordance with the Comprehensive Environmental Response, Compensation, and Liabilities Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It also states the oversight procedures for EPA and the State to ensure Air Force compliance with the specific requirements. The FFA identified 11 site-specific operable units (OUs) and a Base-wide ground-water operable unit. The Base-wide ground-water OU is primarily used to address contaminated ground water that was not addressed during the investigation of a site-specific OU.

Listing on the NPL and execution of the FFA required the U.S. Air Force to perform a remedial investigation/feasibility study (RI/FS) to investigate the 12 operable units. In 1993 and 1994, an extensive RI field program was conducted to characterize conditions at OU-4. The program included: a soil vapor survey, geophysical survey using electromagnetics, drilling and sampling of boreholes, installation of monitoring wells, slug testing of monitoring wells, ground-water sampling, geotechnical analysis of soil samples, ecological evaluation, assessment of human health

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risks, and review and compilation of previous IRP investigations.

Collection and laboratory analysis of soil, ground-water, and sediment samples were included in the RI field program.

A ROD for an interim remedial action (IRA) for OU-4 was signed on 16 May

1995. The objectives of the IRA were (1) to prevent additional transport of contaminated ground water beyond the Base boundary and (2) to remediate ground water in areas which contained higher concentrations of contaminants beyond the Base boundary. The IRA consists of removing contaminated ground water using ground-water wells, and treatment of the contaminated ground water consisting of filtration, air stripping, and activated-carbon adsorption. The treatment system was constructed as part of the IRA.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Community relations activities that have taken place at EAFB to date included:

FFA process. After preparation of the FFA by the USAF, EPA, and SDDENR, the document was published for comment. The FFA became effective April 1, 1992.

Administrative Record. An Administrative Record for information was established in Building 8203 at EAFB. The Administrative Record contains information used to support USAF decision-making. All the documents in the Administrative Record are available to the public.

Information repositories. An Administrative Record outline is located at the Rapid City Library (public repository).

Community Relations Plan (CRP). The CRP was prepared and has been accepted by EPA and the State of South Dakota and is being implemented. An update to this plan will be prepared in 1996.

Restoration Advisory Board (RAB). The RAB has been formed to facilitate public input in the cleanup and meets quarterly. In addition to USAF, EPA, and South Dakota oversight personnel, the RAB includes community leaders and local representatives from the surrounding area.

Mailing list. A mailing list of all interested parties in the community is maintained by EAFB and updated regularly.

Fact sheet. A fact sheet describing the status of the IRP at EAFB was distributed to the mailing list addressees in 1992.

Open house. An informational meeting on the status of the IRP and other environmental efforts at EAFB was held on May 6, 1993. An open house format was also used during the November 16, 1995 Restoration Advisory Board meeting.

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Newspaper articles. Articles have been written for the Base newspaper regarding IRP activity.

Proposed Plan. The proposed plan on this action was distributed to the mailing list addressees for their comments.

A public comment period was held from September 18 to October 18, 1995, and a public meeting was held on September 26, 1995. At this meeting, representatives from EAFB answered questions about the remedial action. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (ROD).

This ROD is based on the contents of the Administrative Record for OU-4, in accordance with the CERCLA, as amended by SARA, and the NCP. The RI/FS reports and the Proposed Plan for OU-4 provide information about OU-4 and the selected remedy. These documents are available at the Information Repositories at EAFB and the Rapid City Public Library.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

The FFA identified 11 site-specific OUs and Base-wide ground-water OU. The 12 operable units are identified as follows:

OU-1	Fire Protection Training Area	OU-2	Landfills Nos. 1		
and 6	OU-3	Landfill No. 2	OU-4	Landfill No. 3	OU-5
Landfill No. 4	OU-6	Landfill No. 5	OU-7	Weapons Storage	
Area	OU-8	Explosive Ordnance Disposal Area (Pramitol Spill)			
OU-9	Old Auto Hobby Shop Area	OU-10	North Hanger Complex		
OU-11	Base-wide Ground Water	OU-12	Hardfill No. 1		

This ROD documents the selected remedial action (RA) at OU-4 and is the sixth ROD for EAFB. The remedial action objectives (RAOs) are to reduce the potential risks posed by contaminants in surface soils and ground water, to reduce the mobility of potential contaminants in the landfill through containment, and to prevent ingestion of contaminated ground water.

The development of alternatives for the landfill was conducted under EPA's Presumptive Remedies Approach [Presumptive Remedies: Policy and Procedures (OSWER Directive 9355.0-47FS); Presumptive Remedy for CERCLA Municipal Landfill Sites (OSWER Directive 9355.0-49FS)]. Selection of an alternative for remediation was streamlined by using preferred technologies based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation.

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The presumptive remedy stipulates containment as the appropriate remedy for landfill. The response action, containment by soil cover, would minimize risk associated with the ingestion, dermal contact, and inhalation exposure pathways.

The area of attainment defines the area over which preliminary remediation goals would be achieved, and is based on the RAOs. The area of attainment for the landfill includes areas not meeting appropriate closure standards. The area of attainment for ground water is defined by those areas beyond the landfill boundary with contaminants at concentrations above remediation goals.

2.5 SITE CHARACTERISTICS

This section describes the presence and distribution of contaminants at OU-4 as a result of past activities.

2.5.1 Soil

Volatile Organic Compounds (VOCs)

Sixteen separate VOCs were reported in soil samples from OU-4. Toluene was the only reported VOC in surface soil samples. Acetone, toluene, ethylbenzene, xylenes, octamethylcyclotetrasiloxane, trichloroethane (TCE), and 1,2-total-dichloroethene were the most commonly reported VOCs in subsurface soil samples. Octamethyltetrasiloxane is a laboratory artifact, and not a site contaminant. No specific pattern of VOC contamination exists in the surface or subsurface soil.

Polynuclear Aromatic Hydrocarbons (PAH)

Four soil samples taken from locations within Landfill No. 3 contained PAH, o-cresol and p-cresol. Benzo(a)pyrene was reported in three surface soil samples. Other than tentatively identified compounds, octamethylcyclotetrasiloxane and di-n-butyl phthalate, no semivolatile organic compounds (SVOCs) were reported in the off-Base soil samples.

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Jet Fuel

Jet fuel was not reported in surface soil samples. Jet fuel was reported in six subsurface soil samples taken within Landfill No. 3, at a maximum concentration of 1,100 mg/kg.

Pesticides and Polychlorinated Biphenyls (PCBs)

Twenty different pesticides and two PCBs were reported in soil samples. The highest frequency of reported pesticides were from surface soil samples collected within Landfill No. 3. Reported pesticides are believed to be a result of normal pesticide application practices on the surface, rather than disposal of waste product.

Inorganic Analytes

Eight inorganic compounds were reported above background in OU-4 surface soil samples. Calcium and magnesium were the inorganic analytes most frequently reported above background concentration. Sixteen inorganic analytes were reported above background levels in OU-4 subsurface soil samples. Lead, silver, and zinc were reported at 4,250, and 18 times, respectively, above the background range in one subsurface sample.

Dioxin/Furan

Reported dioxin/furan included: 2,3,7,8 tetrachlorodibenzofuran; 1,2,3,4,6,7,8 heptachlorodibenzo-p-dioxin and furan; and octachlorodibenzo-p-dioxin and furan. The international toxic equivalents were below the 1,000 picograms per gram (pg/g) level of concern for residential soil.

2.5.2 Sediment

One sediment sample was taken during the 1993 RI. This sample was taken from an off-Base ephemeral stream channel downgradient of OU-4. Reported analytes included acetone in the duplicate analysis only, eight separate PAH compounds, three pesticide compounds, and inorganic compounds.

2.5.3 Ground Water

Organic Contaminants

TCE and total dichloroethene (DCE) were the most frequently reported VOCs in ground-water samples. TCE, vinyl chloride, and 1,2-dichloropropane were reported in samples taken from the shallow aquifer at or above the Maximum Contaminant Level (MCL). Sample results from OU-4 monitoring wells indicate chlorinated hydrocarbons were reported in ground-water samples from four general areas. The first area extends from the center of Landfill No. 3 south past the Base boundary approximately 2,000 feet. The second area is in the southwestern corner of the landfill, and extends off-Base to the south and southwest. There is some indication that these two areas may be interconnected. The third area is an isolated occurrence in the northeast corner of the

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OU. A fourth area is in the vicinity of the control tower.

Off-Base ground-water samples were taken from seven domestic and three livestock wells. Five different analytes including: trichloroethane (TCA), dichloroethane (DCA), total DCE, acetone and TCE were reported. The highest concentrations were reported in samples from the livestock wells. Off-Base sampling of domestic and livestock wells has been conducted since 1990. Results from the first two sampling events conducted in 1990 reported four separate VOCs. Results from the third sampling event reported seven different VOCs. The MCL for TCE was exceeded in two instances during the off-Base investigations. Concentrations of 75 µg/L were reported in a sample from a livestock well and 25 µg/L in a domestic well. As a result, the domestic well was taken out of service in July 1991. Quarterly off-Base ground-water monitoring was implemented by the Air Force in February 1994. One incidence of TCE above the MCL occurred in a December 1994 sample.

Nineteen different SVOCs analytes were reported in ground-water samples from OU-4. Bis(2-chloroethyl)ether and 1,4-dichlorobenzene were the most frequently reported SVOCs in ground-water samples. 1,2,4-trichlorobenzene was reported once above the MCL of 70 µg/L. Pentachlorophenol was reported once at 1 µg/L, equal to the MCL.

Fourteen different pesticides were reported in eight ground-water samples. Aldrin, alpha-BHC, beta-BHC, heptachlor, and heptachlor epoxide were the most frequently reported pesticides in OU-4 ground-water samples. The highest reported pesticide value was for prometon, which was reported once at a concentration of 0.95 µg/L.

Inorganic Contaminants

Seventeen inorganic compounds exceeded background ranges in ground-water samples. Antimony, cadmium, manganese, lead, nickel, and selenium were reported at values that exceeded the MCL in at least one sample. However, antimony, manganese, and selenium were also reported in background samples above the MCL, and are believed to naturally occur at higher concentrations in the area.

2.6 SITE RISK SUMMARY

Human Health Risks

Risk Assessment Process

The assessment of human health risks for this OU considered the following topics: (1) Contaminants of concern (COCs) in ground-water, sediment, and soil samples taken at OU-4;

(2) Current and future land-use conditions;

(3) Potential environmental pathways by which populations might be exposed;

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- (4) Estimated exposure point concentrations of COCs;
- (5) Estimated intake levels of the COCs;
- (6) Toxicity of the COCs; and
- (7) Uncertainties in the assessments of exposure, toxicity, and general risks.

Noncarcinogenic and carcinogenic risks were calculated for the following six potential exposure groups:

- (1) Current EAFB maintenance personnel mowing grass on-site;
- (2) Current off-Base residential use of ground water;
- (3) The future adult living on-site who ingests surface soil;
- (4) The future child/adult living on-site who ingests and showers with shallow ground water;
- (5) The future child/adult living off-site who ingests and showers with shallow ground water;
- (6) Future adult construction workers who excavate on-site for building residences.

A quantitative risk assessment was performed for the ground water, soil, sediment, and air. The risk assessment evaluated potential effects on human health posed by exposure to contaminants within OU-4. Carcinogenic risks were estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential cancer causing chemical. The acceptable risk range expressed as a probability is one cancer incident in ten-thousand people to one cancer incident in a million people. This level of risk is also denoted by 1×10^{-4} to 1×10^{-6} . Risks within the acceptable risk range may or may not warrant remedial action depending upon site-specific circumstances. Risks below this range cannot be differentiated from the background occurrence of cancer in human populations. Risks calculated in a risk assessment are potential risks and are excess (i.e., over background) cancer risks due to exposure from contaminants at the OU.

Noncarcinogenic health risks are evaluated using a hazard index (HI). If the hazard index is less than or equal to one, the contaminant concentration is considered an acceptable level and generally assumes that the human population may be exposed to it during a 30-year period without adverse health effects.

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Risk Assessment Results

The risk assessment for OU-4 indicated that the chemical which contributed the majority of the risk in the soil was benzo(a)pyrene [a polynuclear aromatic hydrocarbon (PAH)]. However, only three of five samples had reported benzo(a)pyrene concentrations in excess of the reasonable maximum exposure (RME) 10⁻⁶ risk range. None of the sample concentrations exceeded the central tendency/average risk range. However, due to the heterogeneity of the landfill contents, uncertainty is associated with the calculated risk values for the surface soil.

The following compounds were identified in the risk assessment as contributing to unacceptable risk (risk drivers) in ground water on-Base: vinyl chloride, 1,1-DCE, TCE, n-nitroso-di-n-propylamine, bis(2-chloroethyl)ether, 1,4-dichlorobenzene, aldrin, alpha-BHC, and heptachlor. In addition, 1,2,4-trichlorobenzene, cadmium, and lead were reported above the MCL in on-Base ground-water samples. Total-1,2-DCE was reported above the MCL for cis-1,2-DCE in on-Base ground-water samples.

Vinyl chloride, 1,1-DCE, TCE, 1,2-DCA, and alpha-BHC were identified as risk drivers in off-Base ground water. In addition, lead and total-1,2-DCE were reported above the MCL in off-Base ground water samples.

Risk Assessment Conclusions

Remediation of the ground water is warranted based on the risk to human health ingesting and contacting contaminated ground water. Remedial action is warranted for the landfill based on potential risk to human health from future releases of hazardous substances. Contaminants in the landfill may leach downward to contaminate the underlying ground water. Off-Base residents may then ingest or come in contact with the contaminated ground water. Also, the surface of the landfill may erode, thus exposing off-Base residents to contaminants in both surface water and air. Due to the potential heterogeneity of the waste materials present within the landfills, a complete characterization of waste materials present was not possible during the RI. This adds a degree of uncertainty to the risk assessment for the landfill contents. Rather than attempting to fully characterize landfill contents and gain more certainty in the risk assessment, the Air Force utilized guidance developed by EPA titled Presumptive Remedy for CERCLA Municipal Landfill Sites (OSWER Directive 9355.0-49FS). The presumptive remedy for landfills is containment (capping) of landfill contents. Using the presumptive remedy strategy, a quantitative risk assessment is not

necessary to evaluate whether the containment remedy addresses all exposure pathways and contaminants potentially associated with a landfill. Rather, all potential exposure pathways can be identified using the conceptual site model and compared to the pathways addressed by the presumptive remedy. Containment of the landfill contents addresses exposure pathways and risks normally associated with landfills. The contaminant exposure pathways for the potential risks associated with the landfill contents at OU-4 include (1) direct physical contact with the landfill contents and (2) consumption or contact with ground water that may become contaminated.

Actual or threatened releases of hazardous substances from OU-4, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, and the environment.

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Ecological Risks

An ecological risk evaluation of OU-4 was based on a combination of data and literature reviews, field and laboratory analyses, analyte evaluation and screening, and preliminary risk screening. The pertinent findings are summarized below.

A variety of animal species may live, forage, or nest in OU-4 habitats. These species include various types of invertebrates, amphibians, birds, and mammals. Terrestrial vegetation and soil faunal communities do not reveal characteristics that indicated chemical-related impacts. This finding is consistent with the relatively low levels of contaminants in the soil.

Because of the altered natural environment at OU-4, rare, threatened, or endangered species are unlikely to utilize the area for more than brief, periodic habitat. Due to the low levels of contaminant concentrations, the contaminants do not pose an unacceptable risk to these species. In addition, the limited contact these species would have with OU-4 ensures unacceptable risk to a single individual is not likely to occur.

Findings of the RI indicate that the contaminants at OU-4 are not altering the ecology to unacceptable levels. A Base-wide ecological risk assessment will be conducted as part of OU-11, and OU-4 will be included in this Base-wide evaluation.

2.7 DESCRIPTION OF ALTERNATIVES

Presumptive Remedy for CERCLA Municipal Landfill Sites, (OSWER Directive 9355.3-11FS) was the basis for the abbreviated feasibility study (FS).

The OSWER directive established containment of the contamination within the landfill as the presumptive remedy for municipal landfills.

Although not specifically identified as a municipal landfill, OU-4 exhibits characteristics that make this presumptive remedy applicable. The alternatives are briefly described below. A more detailed description is provided in the FS report.

Alternative 1 (Landfill)

No Action

The no action alternative represents the baseline condition at OU-4 and refers to taking no further action at Landfill No. 3.

Alternative 2 (Landfill) - Institutional Controls

Institutional controls (access restrictions and deed restrictions).

Monitoring of ground water.

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Repair of existing cover in the southwest corner, as necessary.

Long-term maintenance of existing soil cover.

Alternative 3 (Landfill) - Capping

Monitoring and institutional controls as stated in Alternative 2.

Place soil cover capable of sustaining vegetation on the area of attainment at the landfill.

Monitoring for landfill gas around the landfill perimeter and install a with passive gas venting layer as part of the soil cover, as necessary.

Long-term maintenance of soil cover.

Alternative 4 (Ground Water) - No Further Action

No Further Action

The no further action alternative represents the baseline condition at OU-4 and refers to taking no further action for the ground water at OU-4.

Alternative 5 (Ground Water) - Ground-Water Recovery Trench/IRA
Treatment Plant/Discharge

Install ground-water recovery trenches along the southern Base
boundary, and in the off- Base plume.

Treat extracted ground water at the IRA treatment plant.

Discharge of treated ground water to a surface water drainage
channel.

Underground injection of ground water is retained as a contingency
discharge option.

Alternative 5A (Ground Water) - Slurry Wall/Ground-Water Recovery
Trench/IRA Treatment Plan/Discharge

Ground-water recovery trench and treatment components as stated in
Alternative 5.

Installation of a slurry wall upgradient and sidegradient of the
landfill

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Alternative 6 (Ground Water) - Extraction Wells/IRA Treatment
Plant/Discharge

Install ground-water extraction wells along the southern Base
boundary, and in the off- Base plume

Treat extracted ground water at the existing IRA treatment plant.

Discharge of treated ground water to a surface water drainage
channel.

Underground injection of treated ground water is retained as a
contingency discharge option.

Alternative 6A (Ground Water) - Slurry Wall/Extraction Wells/IRA
Treatment Plant/Discharge

Extraction well and treatment components as stated in Alternative
6. Installation of a slurry wall upgradient and sidegradient of
the landfill.

2.8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The analysis of alternatives coupled with the use of the presumptive remedy combine for a narrower range of feasible approaches to address landfill remedial activities at OU-4.

The remedial action objectives for OU-4 are as follows:

Landfill

Prevent dermal contact and ingestion of surface soils within OU-4

Reduce the mobility of potential contaminants in the landfill.

Ground Water

Prevent inhalation, dermal contact, and ingestion of ground water containing contaminants at concentrations exceeding the remediation goals.

The area of attainment is defined as the area which will achieve the remedial action objectives after remediation is completed. The physically or geographically distinct areas of OU-4 make it feasible to divide the OU into separate areas for purposes of evaluating attainment status and determining appropriate response actions. OU-4 has been divided into four distinct areas for these purposes: 1) Landfill No. 3; 2) construction disposal area; 3) on-Base ground water, and 4) off-Base ground water.

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Landfill No. 3

The area of attainment for this remedial action is the extent of Landfill No. 3 which is approximately 35-40 acres in size (Figure 2-3).

Construction Disposal Area

The area of attainment for ground water from the construction disposal area is at the western Base boundary.

On-Site Ground Water

Because the landfill waste will be managed in place, ground water beneath the landfill is not within an area of attainment. The area of attainment for on-Base ground water will be landfill boundaries (Figure 2-4).

Off-Site Ground Water

The area of attainment for off-Base ground water is defined by those areas with contaminants above remediation goals (MCLs, or risk-based State Ground Water Quality Standards). This area approximately corresponds to the area identified by the TCE plume (Figure 2-4).

Pursuant to Section 40 CFR 300.430(e)(9)(iii), the remedial action to be implemented should be selected based upon consideration of nine evaluation criteria. These criteria are as follows:

1. Overall protection of human health and environment.
2. Compliance with applicable or relevant and appropriate requirements (ARARs).
3. Long-term effectiveness and permanence.
4. Reduction of toxicity, mobility, or volume of contamination.
5. Short-term effectiveness.
6. Implementability.
7. Cost.
8. State acceptance.
9. Community acceptance.

The following sections provide a brief review and comparison of the remedial alternatives according to EPA's evaluation criteria.

2.8.1 Overall Protection of Human Health and the Environment

The assessment of this criterion considers how the alternatives achieve and maintain protection of human health and the environment.

Alternatives 1 and 4 (no further action) do nothing to reduce risk at OU-4. Alternative 2 (Institutional Controls) provides for care of the OU through maintenance of erosional and/or non-vegetated areas. Access restrictions would reduce risk by reducing exposure associated with the

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landfill. Alternative 3 (Capping) provides containment (cover) of the surface soil and the landfill contents. This would minimize risk associated with exposure to soil and the future risk associated with potentially contaminated ground water. Alternatives 5, 5A, 6, and 6A would remediate ground water to MCLs, thus reducing risk by reducing concentrations of contaminants in the ground water.

2.8.2 Compliance with ARARs

Alternatives are assessed under this criterion in terms of compliance with ARARs. Applicable requirements include cleanup standards, standards of control and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State of South Dakota laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a

CERCLA site.

Relevant and appropriate requirements address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the environmental and technical factors at a particular site. The determination of "relevant and appropriate" emphasizes the similarity and appropriateness of the requirement to a site. ARARs are grouped into these three categories:

Chemical-Specific ARARs are health or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in establishment of the amount or concentration that may be found in, or discharged to, the environment.

Location-Specific ARARs restrict the concentration of hazardous substances or the conduct of activities solely because they are in specific locations such as flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

Action-Specific ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous wastes.

A summary evaluation of Federal and State ARARs pertinent to this remedial action is provided in Table 2-1 at the end of Section 2.0 and a narrative discussion of compliance with ARARs is provided below for the alternative considered.

Alternatives 1 and 4 (No Further Action):

The No Further Action alternative does not comply with State soil waste landfill closure requirements, State criteria for petroleum contaminated soil (ARSD Chapter 74:03:32), or ground-water ARARs. No Federal or State permits are required for this alternative. Alternatives 1 and 4 do not meet the remedial action objectives for OU-4. No action would not be taken to prevent human contact with contaminants in the surface soils and ground water. Contaminants within the landfill would continue to leach to the ground water.

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Alternative 2 (Institutional Controls):

Alternative 2 does not meet all the State of South Dakota solid waste landfill closure requirements, State criteria for petroleum contaminated soil, or ground-water ARARs. No Federal or State permits are required for this alternative. Alternative 2 does not meet the remedial action objectives for OU-4.

Alternative 3 (Capping):

Alternative 3 will meet or exceed State of South Dakota Waste Management Regulations for the disposal of solid waste (ARSD Article 74:27) by providing containment of landfill contents, access/development restrictions, and long-term monitoring. Information from the remedial investigation indicates that approximately one to two feet of cover material exists over most of the landfill. The exact cover thicknesses throughout the entire landfill are unknown. The State requires a minimum of two feet of cover material. Additional cover material (a minimum of one foot in depth) will be added under this alternative to achieve compliance with the State requirements. The exact cover design will be determined during the remedial design phase. The State is Federally authorized for the Resource Conservation and Recovery Act (RCRA) Subtitle D Municipal Solid Waste Program (8 October 1993, 58 FR 52486). State of South Dakota remediation criteria for petroleum contaminated soil is not applicable within the landfill boundaries. However, the intent of the regulations (to minimize leaching of contaminants to ground water) would be met by containment of landfill contents. The resulting cover will also assist in compliance with the Safe Drinking Water Act Maximum Contaminant Levels (MCLs) by minimizing the downward transport of contaminants to the ground water.

Alternatives 5, 5A, 6 AND 6A (Ground-Water Pump and Treat):

Alternatives 5, 5A, 6 and 6A would achieve containment of on-Base ground water at the landfill boundary, in accordance with the Presumptive Remedy Guidance. Removed ground water would be treated to achieve MCLs. Sufficient ground water would be removed and treated so that MCLs would be met at the Base boundary. Off-Base contaminated ground water would be removed and treated to achieve MCLs, with the ultimate requirement of restoration of off-Base ground water to MCLs.

2.8.3 Long-Term Effectiveness and Permanence

The assessment of this criterion considered the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response action objectives have been met.

Alternatives 1 and 4 would not provide additional effectiveness or permanence in reducing the potential for direct contact or ingestion of the surface soil or sediments. No further controls for the OU would be developed under this alternative.

Alternative 2 would provide for increased effectiveness of access restrictions (in addition to the general EAFB access restrictions). Additionally, vegetation maintenance would reduce erosion

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potential. Permanency and reliability of these controls would be enhanced through long-term monitoring and maintenance of the OU. Uncertainties exist for the ability to provide long-term access restrictions.

Alternative 3 would offer the highest level of long-term effectiveness. Reduction of risk would be accorded by the soil cap. Erosion would be limited by the development and maintenance of a vegetated area. Upon completion, long-term maintenance of the cover and monitoring of ground water would be provided. Future land uses will be allowed for the landfill only if the integrity of the landfill cover is not compromised.

Alternative 5, 5A, 6 and 6A would offer a high level of long-term effectiveness for ground water. Reduction of risk would be accorded by a reduction in the concentration of chemicals in the ground water. Remediation of the existing contaminated ground water in conjunction with a landfill cover would prevent the movement of contaminants from beyond landfill boundary.

2.8.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

The assessment of this criterion involves considering the anticipated performance of specific treatment technologies an alternative may employ.

Alternative 1 would not provide for the reduction of toxicity, mobility, or volume of the chemicals of concern in the surface soil and sediment. Alternative 2 would reduce the mobility of contaminants in surface soils through long-term maintenance of existing cover soils. Alternative 3 does not use treatment technologies, but reduces the mobility of the contaminants in surface soils in the landfill area through containment. Alternatives 5 and 6 reduce the toxicity and mobility of ground water through extraction and treatment. Alternative 5A and 6A reduce the toxicity, mobility, and volume of ground water to be treated.

2.8.5 Short-Term Effectiveness

The assessment of this criterion considers the effectiveness of alternatives in maintaining protection of human health and the environment during the construction of a remedy until response action objectives have been met.

It is not anticipated that the proposed alternatives would significantly impact worker or community health and safety during the implementation period. Alternatives 2 and 3 may impact community and worker health and safety through dust emissions during the initial construction phase. The impact could be minimized through dust mitigation. Alternatives 5, 5A, 6 and 6A may impact community and worker health and safety through volatile emissions during air stripper operation. The impact could be minimized by treatment of emissions.

Alternatives 2 and 3 may create a short-term increase in risk during remedial activities due to the inhalation exposure pathway. Disturbance of surface soil through earthwork would result in exposure to workers. Dust mitigation during these activities would minimize this potential impact. Alternative 3 would present the potential for temporarily increasing the opportunity for erosion of the disturbed soils, although erosion and sediment control measures will help to

minimize this adverse impact.

Alternatives 5, 5A, 6 and 6A may create a short-term increase in risk during remedial activities due to the inhalation of volatile compounds emitted by the air stripper. Air monitoring and emission treatment, if necessary, during this activity would minimize the potential impact.

2.8.6 Implementability

The assessment of this criterion considers the administrative and technical feasibility of implementing the alternatives and the availability of necessary goods and services for implementation of the response action.

Alternative 1 would not be difficult to implement since no further action would be undertaken.

Alternative 2 requires no special or unique activities and could be implemented using locally available materials and contractors. Long-term monitoring would indicate whether additional action would need to be implemented in the future.

Alternative 3 could be implemented with standard construction equipment, materials, and methods. The availability of an on- or off-Base supply of cover material will require further consideration during the Remedial Design Analysis. Land use (or deed) restrictions can be implemented at EAFB by various administrative means.

Alternatives 5, 5A, 6 and 6A require no special or unique activities and could be implemented with widely available equipment, materials, and methods. The existing IRA treatment plant would be utilized to treat ground water.

2.8.7 Cost The assessment of this criterion considers the capital and operation and maintenance (O&M) costs associated with each of the alternatives. Alternatives are evaluated for cost in terms of both capital costs and long-term O&M costs necessary to ensure continued effectiveness of the alternatives. Capital costs include the sum of the direct capital costs (materials and labor) and indirect capital costs (engineering, licenses, permits). Long-term O&M costs include labor, materials, energy, equipment replacement, disposal, and sampling necessary to ensure the future effectiveness of the alternative. The objective of the cost analysis is to evaluate the alternatives based on the ability to protect human health and the environment for additional costs that may be incurred. Cost varies between the alternatives as a result of differences in the amount of materials and the level of effort required for each alternative. A summary of the costs for each alternative is as follows:

Alternative No. 1 (No Action)

Total Capital Costs \$0 Total Annual (Sampling/Analysis) Costs \$0

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Alternative No. 1 (No Action)

30-Year Present Value for Annual Costs \$0 Annual Cost = \$0 Years = 30
Discount Rate = 5%

TOTAL 30-Year Present Value \$0

Alternative No. 2 (Institutional Controls)

Total Capital Costs \$293,000

Total Annual (Sampling/Analysis/O&M)Costs \$76,000

30-Year Present Value for Annual Costs \$1,169,000 Annual Cost = \$76,000
Years = 30 Discount Rate = 5%

TOTAL 30-Year Present Value \$1,462,000

Alternative No. 3 (Capping)

Total Capital Costs \$3,004,560

Total Annual (Sampling/Analysis/O&M) Costs \$80,300

30-Year Present Value for Annual Costs \$1,235,000 Annual Cost = \$80,300
Years = 30 Discount Rate = 5%

TOTAL 30-Year Present Value \$4,239,500

Alternative No. 5 (Extraction Trench and Treatment)

Total Capital Costs 1,398,000

Total Annual (Sampling/Analysis/O&M)Costs 76,600

30-Year Present Value for Annual Costs Annual Cost = \$76,600 Years = 30
Discount Rate = 5% 1,178,000

TOTAL 30-Year Present Value 2,576,000

Alternative No. 5A (Extraction Trench, Treatment, and Slurry Wall)

Total Capital Costs 2,289,000

Total Annual (Sampling/Analysis/O&M) Cost 76,600

30-Year Present Value for Annual Costs

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Annual Cost = \$76,600 Years = 30 Discount Rate = 5% 1,178,000

TOTAL 30-Year Present Value 3,467,000

Alternative No. 6 (Extraction Wells, Treatment)

Total Capital Costs 1,490,000

Total Annual (Sampling/Analysis/O&M) Costs 82,000

30-Year Present Value for Annual Costs Annual Cost = \$82,000 Years = 30
Discount Rate = 5% 1,261,000

Total 30-Year Present Value 2,751,000

Alternative No. 6A (Extraction Wells, Treatment, and Slurry Wall)

Total Capital Costs 2,381,000

Total Annual (Sampling/Analysis/O&M) Costs 82,000

30-Year Present Value for Annual Costs Annual Cost = \$82,000 Years = 30
Discount Rate = 5% 1,261,000

TOTAL 30 Year Present Value 3,642,000

2.8.8 State Acceptance

The assessment of this criterion considered the State's preferences for or concerns about the alternatives.

The State concurs with the selected remedy. The State provided comments on the remedial investigation, feasibility study, and Proposed Plan. In accordance with the requirements of the NCP, the State of South Dakota was also provided the opportunity to review and comment on the ROD. As a result of that review and after incorporating adequate responses to the comments into the respective documents, the State concurred with the remedy.

2.8.9 Community Acceptance

Comments offered by the public were used to assess the community acceptances of the proposed alternative. The community expressed their concerns about the selected remedy during the public comment period. The questions and concerns of the community are discussed in detail in the Responsiveness Summary, which is Appendix B of the ROD.

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2.9 SELECTED ALTERNATIVE

Based on the requirements of CERCLA, comparative analysis of the nine criteria, public comments, and in consultation with EPA and the State, the Air Force has determined that the selected alternative is Alternative 3, Landfill Cover; and Alternative 5, extraction trenches and treatment for ground water. This alternative includes institutional controls in conjunction with physical modification of the OU, and treatment of extracted ground water to reduce potential risk. Five-year reviews of the remedy will be required because potential contaminants will remain at OU-4 above health-based levels following completion of the installation of the landfill cover and ground-water extraction system.

Major components of Alternative 3 are:

Installing an earthen cover over the area attainment (approximately 35-40 acres).

Institutional controls to prevent future use of the area for residential use and/or limiting its use to industrial uses.

Providing for long-term ground-water monitoring at the OU to identify development of future risk associated with the OU.
Providing long-term maintenance of the remedial actions taken at the OU.

Installation of Soil Cover

A pre-design study would be conducted to verify the defined limits of the landfill and determine the type of cover needed. The cover material must be capable of sustaining vegetation. The pre-design study would also be used to determine the type of cover needed to reduce infiltration of precipitation through the landfill and ensure continued compliance with the MCLs.

Based on the results of the pre-design study, either a single-layer earth cover or multi-layer reduced-permeability earth cover would be

constructed. The selected cover would be constructed to comply with State requirements. The area of attainment would be filled, graded, and contoured to maintain stability, eliminate slumping, settling, or ponding of water above previously active disposal areas, and to provide positive drainage off the landfill area. The area would also be vegetated to provide and maintain suitable vegetation to enhance evapotranspiration and reduce infiltration and soil erosion.

Institutional Controls

Institutional controls would be implemented to prevent human exposure to contaminated soil and ground water. These controls will include: (1) issuing a continuing order to restrict on-site worker access to the landfill and to restrict or control temporary construction activities unless proper protective equipment is worn; (2) filing a notice with the State to recommend denial of water appropriation permit applications to install ground-water wells within the landfill boundary and any area which may be effected by potential contaminants; (3) filling a notice to the deed detailing the restrictions of the continuing order and ground-water well restrictions; and (4) a

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covenant to the deed in the event of property transfer.

A continuing order would be issued by the Installation Commander to restrict access to or disturbance of the landfill as long as Ellsworth AFB owns the property. Specifically, it would:

Restrict or place limitations on the installation of any new underground utilities or other construction activities in the area of the landfill; thus preventing accidental exposures to construction workers.

Provide for the use of proper protective equipment, in the event that access through the landfill cover is required.

Require that the integrity of the landfill cover be maintained. Maintenance of the landfill will require development of standard operating procedures (SOPs) to provide for inspections and repairs.

The continuing order also would mandate that, if the landfill cover was ever removed or destroyed, the area of attainment would be re-evaluated to determine the need for a replacement cap or other remedial action.

Continuing order requirements will be in effect as long as the property is owned by Ellsworth AFB. In the case of the sale or transfer of property

within OU-4 by the United States to any other person or entity, the Air Force will place covenants in the deed which will restrict access and prohibit disturbance of contaminated soils or the remedial action without approval of the United States. These covenants will be in effect until removed upon agreement of the State of South Dakota, the U.S. Environmental Protection Agency, and U.S. Air Force or their successors in interest. The Air Force will also include in the deed the covenants required by section 120(h)(3) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which include (1) a warranty that the United States will conduct any remedial action found to be necessary after the date of the transfer; (2) a right of access in behalf of EPA and the Air Force or their successors in interest to the property to participate in any response or corrective action that might be required after the date of transfer. The right of access referenced in the preceding sentence shall include the State of South Dakota for purposes of conducting or participating in any response or corrective action that might be required after the date of transfer.

Long-Term Monitoring and Maintenance

- A maintenance program would be established to ensure the long-term integrity on the landfill cover system would be maintained. The maintenance program would include development of SOPs to provide for inspections, repairs, and general maintenance of the landfill.
- A long-term monitoring program will be developed and implemented during remedial action and is subject to approval of both EPA and SDDENR. Contaminant concentrations in the ground water in the off-Base area of contamination and at the landfill boundary would be monitored to evaluate the effectiveness of the landfill cover and the ground-water treatment system, and to determine if ground-water contaminants have been transported beyond the landfill boundary.

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Continued analysis and monitoring of the ground-water remedial action system performance will be conducted to determine if the remediation system is approaching an asymptotic level due to physical limitation of the site, or the benefits of the remedial action no longer justify the long-term operation of the system. Remediation goals and the remedial alternative will be re-evaluated at that time.

This alternative will meet the remedial action objectives and reduce the potential risk for OU-4 by preventing future exposure to contaminants in the surface soils and by reducing the mobility of potential contaminants in the landfill. This will be achieved by the construction of the landfill cap.

The major components of Alternative 5 are:

Continued operation of the IRA, which consisted of removal and treatment of contaminated ground water;

Installation recovery trenches to be added to the existing IRA ground-water recovery system.

Treatment of removed ground water at the IRA treatment plant.

Discharge of treated ground water to a surface water drainage, the Base waste- water treatment plant, or by underground injection.

Continued Operation of the IRA

The IRA consisted of ground-water wells to remove contaminated ground water near the landfill boundary and in an area beyond the Base boundary. The IRA also included the construction of a treatment plant for the treatment of the soil gas and contaminated ground water. The IRA will be continually operated and the additional ground-water collection trenches (or wells) described below will be added to the system.

Ground-Water Recovery System

Ground-water collection trenches will be installed at OU-4 remediate contamination in the shallow alluvial ground water (Figure 2-4). The number and placement of trenches will be evaluated during the design. The IRA included the installation of ground water wells to remove contaminated ground water. An evaluation will be performed to determine the effectiveness of the ground-water wells. If the most cost-effective method to remove contaminated ground water is by ground-water wells, additional wells will be installed in lieu of the proposed collection trenches.

Treatment and Discharge

Ground water removed by the recovery system will be treated at the treatment plant built for the IRA. The water effluent from the treatment plant is expected to be discharged into a drainage which flows into Pond 001. The effluent will be monitored prior to discharge to determine the

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effectiveness of the treatment system. Effluent discharge standards and

monitoring will be determined during the design phase and are subject to State and EPA reviews and approvals. Underground injection or discharge to the Base waste-water treatment plan may be chosen as the discharge option based on the allowable discharge standard. The expected surface discharge will comply with the requirements of the Clean Water Act. Off-gas from the thermal oxidizer will be monitored to ensure compliance with Federal, State, and local requirements under the provisions of the Clean Air Act.

This alternative will meet the remedial action objectives and reduce the potential risk for OU-4 by preventing future exposure to contaminants in the ground water and by reducing the mobility of potential contaminants in the ground water.

2.10 STATUTORY DETERMINATIONS

The selected remedy meets the statutory requirements of CERCLA as amended by SARA. These requirements include protection of human health and the environment, compliance with ARARs, cost effectiveness, utilization of permanent solutions and alternative treatment technologies to the extent practicable. Containment, by definition, does not attempt to reduce the toxicity or volume of potentially hazardous materials; rather, it reduces the likelihood of exposure to these materials by preventing the movement of materials beyond the boundaries of the landfill and preventing direct contact with landfill material. The selected remedy represents the best balance of tradeoffs among the alternatives considered, with respect to pertinent criteria, given the scope of the action.

The manner in which the selected remedy meets each of these requirements is discussed in the sections below.

2.10.1 Protection of Human Health and the Environment

The selected remedy addresses health and environmental issues that were identified in the OU-4 RI report. Specifically, the capping alternative:

- Eliminates exposure to landfill contents by installing an earthen cover.

- Reduces the potential infiltration of contaminants to the ground water.

- Prevents unauthorized access to the area by installing a perimeter fence and restricted access signs.

- Provides for long-term monitoring of ground water to identify potential future risks associated with OU-4. The ground-water alternative:

- Eliminates exposure to ground water by receptors of concern.

- Reduces the concentration of VOCs and metals in ground water, thereby reducing

risk.

Contains the ground-water plume, thereby eliminating the mobility of chemicals in the ground water.

2.10.2 Compliance with ARARs

Alternative 3 will meet State landfill closure requirements by providing containment of landfill contents, access/development restrictions and long-term monitoring. Alternative 5 will meet Safe Drinking Water Act maximum contaminant levels and State Ground Water Quality Standards. Additional information about ARAR compliance is contained in Section 2.8.2

Implementation of the presumptive remedy (containment by cover) strategy for landfill has been shown by EPA to meet the remedial action objectives by preventing direct contact with landfill contents and ingestion of surface soils. 2.10.3 Cost Effectiveness

The selected remedy provides overall effectiveness in reducing human health risks relative to its costs. The presumptive remedy process insures cost effective remedies are chosen. The chosen landfill cover type ensures containment of the landfill contents. Site specific conditions were used to determine the type of cover necessary for the landfill. Based on the information provided during the remedial investigation, a more costly landfill cover would not be cost effective. The selected ground-water remedy provides the most effective alternative for ground-water remediation.

2.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Extent Possible

EPA has established that proper capping has proven effective in containing landfill contents. This alternative provides long-term prevention of exposure to potential landfill material, prevents unauthorized access. The ground-water treatment system will provide long-term prevention of exposure to contaminants in ground water. A long-term ground-water monitoring system will be implemented to detect potential movement of chemicals from the area of attainment.

A five-year review of the selected remedy will be performed due to the uncertainty of the landfill contents. The review will be conducted no less often than every five years after the signing of the ROD to ensure the remedy continues to provide adequate protection of human health and the environment.

2.10.5 Preference for Treatment as a Principal Element

Treatment of the landfill contents is not supported based on the findings of the remedial investigation for OU-4. No identifiable hot spots were reported present and the risks associated with OU-4 can be addressed by

eliminating exposure to the landfill contents by capping. Treatment of ground water by the IRA treatment plant satisfies the statutory requirement of

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treatment as a principal element.

2.11 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan identified Alternative 3, landfill cover, as the preferred alternative. A multi-layer soil cover was used in the Proposed Plan as the basis for the cost estimate for Alternative 3. The need for a multi-layer cover, as opposed to a single layer soil cover will be evaluated as part of the remedial design. Therefore, the cover option in Alternative 3 has been modified to reflect the cost for a 2 ft soil cover until the result of the remedial design evaluation are available.

TABLE 2-1 EVALUATION OF FEDERAL AND STATE ARARS THAT APPLY TO OU-4, ELLSWORTH AFB, SOUTH DAKOTA

Applicable or Relevant and Appropriate Federal Standards, Requirements, Criteria and Limitations

Standard, Requirement, Criteria or Description ARAR Type Applicability Limitation	Citations
Safe Drinking Water Act of 1986	42 USC 300g

National Primary Drinking Water	40 CFR Part 141.11-.12
Specifies maximum contaminant levels (MCLs) appropriate for federal Standards of public water systems	Chemical Relevant and of Class II aquifers. 40
CFR Part 143.03 National Secondary Drinking Water	
Establishes secondary maximum contaminant appropriate. Standards	Chemical Relevant and levels (SMCLs)
for public water systems. These are federally non-enforceable standards which regulate contaminants in drinking water that primarily affect the qualities	
	Establishes drinking
water quality goals set at 40 CFR 141.50 and anticipated adverse health Maximum Contaminant Level Goals	levels of unknown or Public
Law No. 99-330,100 effects, with an adequate margin of safety	Chemical
Relevant and appropriate. Stat. 642 (1986)	

Clean Water Act of 1977	33 USC 1251-1376
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Water Quality Criteria	40 CFR Part 131.36
Establishes criteria for water quality based on and appropriate. Aquifer may toxicity to aquatic organisms and human health be a federal Class II A (discharge to surface water).	Chemical Relevant

Criteria and Standards for the National	40 CFR Part 125.1.3
Establishes criteria and standards for technology- and appropriate. Pollutant Discharge Elimination System based requirements in permits under the Clean Water Act	Chemical Relevant

Clean Air Act of 1983

National Primary and Secondary Ambient	40 CFR Part 50.1-.6,8,9,
Establishes standard for ambient air quality to	Action
Applicable Air Quality Standard	.11,.12, and Appendices
A, protect public health and welfare. H,J,K Establishes regulatory	
standard for specific air National Emission Standards for Hazardous	40
CFR Part 61.01 pollutants.	Action
Applicable. Several alternatives would Air Pollutants	
require discharge to the air following treatment.	

TABLE 2-1 (continued)

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South Dakota

Applicable or Relevant and Appropriate State Standards, Requirements, Crite
Limitations

South Dakota Waste Management	74:26:03:11	Establishe
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appropriate. Regulations wastes in sanitary landfills			hazardous
South Dakota Waste Management appropriate. Regulations facilities	74:27:03:11		Defines re disposal
South Dakota Waste Management appropriate. Regulations monitoring	74:27:15		Establishes sta closure
South Dakota Water Quality Standards appropriate.	74:03:04:02,10		Defin tributaries
South Dakota Ground Water Standards ground-water classifications by beneficial chemical standards	74:03:15	Chemical	Defin Relevant and appropri use and sets
South Dakota Surface Water Quality surface water quality standards. Standards	74:03:02	Chemical	Establishes Relevant and appropriate.
South Dakota Remediation Criteria for appropriate. Petroleum-Contaminated Soils contaminated with petroleum products.	74:03:32		Establishe soil

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30. LIST OF ACRONYMS AND ABBREVIATIONS

ACC:	Air Combat Command
AF:	Air Force
AFB:	Air Force Base

ARARs:	Applicable or Relevant and Appropriate
Requirements	
CERCLA:	Comprehensive Environmental Response,
Compensation and Liability Act	
COC:	Chemicals of Concern
DNAPL:	Dense non-aqueous phase liquid
EAFB:	Ellsworth Air Force Base
EP:	Extraction Procedure, the EPA's standard laboratory
procedure for	
	leachate generation
EPA:	Environmental Protection Agency
FFA:	Federal Facilities Agreement
FPTA:	Fire Protection Training Area
FTA:	Fire Training Area
GPR:	Ground Penetrating Radar
HQ:	Headquarters
IN SITU:	In the original place
IRA:	Interim Remedial Action
IRIS:	Integrated Risk Information System
IRP:	Installation Restoration Program
JP-4:	Jet Propulsion Fuel Number Four; contains both ker
and gasoline	
	fractions.
LNAPL:	Light Non-Aqueous Phase Liquid
MCL:	Maximum Contaminant Levels
mgd:	Million Gallons per Day
ug/l:	Micrograms per liter
mg/l:	Milligrams per liter
MSL:	Mean Sea Level
NAPL:	Non Aqueous Phase Liquid
NCP:	National Oil and Hazardous Substances Contingency Plan
NEPA:	National Environmental Policy Act
NPDES:	National Pollutant Discharge Elimination System
NPDWR:	National Primary Drinking Water Regulations
NPL:	National Priorities List

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OU:	Operable Unit
O&G:	Symbols for oil grease
PAH:	Polynuclear Aromatic Hydrocarbon
PCB:	Polychlorinated Biphenyl; liquids used as a dielectrics
electrical	
	equipment
PCE:	Perchloroethylene; liquids used in degreasing or paint
removal.	
pg/g:	picograms per gram
PL:	Public Law
ppm:	Parts per million by weight
RCRA:	Resource Conservation and Recovery Act
RI/FS:	Remedial Investigation/Feasibility Study
ROD:	Record of Decision

SARA: Superfund Amendments and Reauthorization Act
SACM: Superfund Accelerated Cleanup Model
SVOC: Semivolatile Organic Compound
TCA: 1, 1, 1,-tetrachloroethane
TCE: Trichloroethylene
TCL: Target Compound List
TCLP: Toxicity Characteristic Leaching Procedure
TDS: Total Dissolved Solids
TOC: Total Organic Carbon
TSD: Treatment, storage or disposal sites/methods
USAF: United States Air Force
U.S. EPA: United States Environmental Protection Agency
USDA: United States Department of Agriculture
USFWS: United States Fish and Wildlife Service
USGS: United States Geological Survey
VES: Vertical Electrical Sounding
VOC: Volatile Organic Compound
WQC: Water Quality Criteria
WWTP: Wastewater Treatment Plant

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APPENDIX A

FIGURES

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APPENDIX B

RESPONSIVENESS SUMMARY

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Responsiveness Summary
Remedial Action at Operable Unit Four
Ellsworth Air Force Base, South Dakota

1. Overview

The United States Air Force (USAF) established a public comment period from

September 18 to

October 18, 1995 for interested parties to review and comment on remedial a considered and described in the Proposed Plan for Operable Unit Four (OU-4)

Proposed

Plan was prepared by the USAF in cooperation with the U.S. Environmental Pr Agency

(USEPA) and the South Dakota Department of Environment and Natural Resource (SDDENR).

The USAF also held a public meeting at 6:30 p.m. on September 26, 1995 in t Bomb Wing

Auditorium at Ellsworth Air Force Base (EAFB) to outline the proposed remed reduce risk

and control potential hazards at Operable Units 1, 2, and 4.

Some of the public comments pertained to the selected remedies in the Propo for all the

operable units. Rather than attempting to separate out the comments which

an

individual operable unit, on Responsiveness Summary was prepared to address comments

for all the operable units.

The Responsiveness Summary provides a summary of comments and questions rec from the

community at the public meeting and during the public comment period as wel USAF's

responses to public comments.

The Responsiveness Summary is organized into the following sections:

Background on Community Involvement

Summary of Comments and Questions Received During the Public Commen Period and USAF Responses

Remaining Concerns

The selected alternative for the landfill, soil, cover, includes the follow components:

Institutional controls for the landfill area;

Placing a soil cover capable of sustaining perennial vegetation ove area;

Landfill gas monitoring and passive collection system, as necessary

Long-term monitoring and maintenance.

The selected alternative for the ground water, pump and treat, includes the major

components:

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Continued operation of the interim remedial action (IRA) which consists of removal and treatment of contaminated ground water;

Installation of recovery trenches and/or additional extraction wells to the existing IRA ground-water recovery system.

Treatment of removed ground water at the treatment plant built for

Discharge of treated ground water to a surface water drainage, to the wastewater treatment plant, or by underground injection.

2. Background on Community Involvement

On August 30, 1990 EAFB was listed on the USEPA's National Priorities List. A Federal Facilities Agreement (FFA) was signed in January 1992 by the Air Force, EPA, the State and went into effect on April 1, 1992. The FFA establishes a program framework and schedule for developing, implementing, and monitoring appropriate response at EAFB.

Community relations activities that have taken place at EAFB to date include

FFA process. After preparation of the FFA by the USAF, EPA, and SD, the document was published for comment. The FFA became effective April 1, 1992.

Administrative Record. An Administrative Record for information was established in Building 8203 at EAFB. The Administrative Record contains information used to support USAF decision-making. All the documents in the Administrative Record are available to the public.

Information repositories. An Administrative Record outline is located at the Rapid City Library (public repository).

Community Relations Plan (CRP). The CRP was prepared and has been accepted by EPA and the State of South Dakota and is currently being

An update to this plan will be prepared in 1996.

Restoration Advisory Board (RAB). The RAB has been formed to facilitate public input in the cleanup and meets quarterly. In addition to US and South Dakota oversight personnel, the RAB includes community leader

representatives from the surrounding area.

Mailing list. A mailing list of all interested parties in the community is maintained by EAFB and updated regularly.

Fact sheet. A fact sheet describing the status of the IRP at EAFB is distributed

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to the mailing addressees in 1992.

format Open house. An informational meeting on the status of the IRP and o environmental efforts at EAFB was held on May 6, 1993. An open hou

was also used during the November 16, 1995 Restoration Advisory Boa meeting.

regarding Newspaper articles. Articles have been written for the base newspa
IRP activity.

The Proposed Plan for this remedial action was distributed to the mailing l
for their comments, and additional copies of the Proposed Plan were available at the
26, 1995 public meeting. A transcript of comments, questions and responses provided
public meeting was prepared.

3. Summary of Comments and Questions Received During the Public Comment
Period and USAF Responses

Part I - Summary and Response to Local Community Concerns

Review of the written transcript of the public meeting did not indicate com
objections to the proposed remedial action. No written comments were received during the
comment period.

The majority of the comments received during the public meeting were in the
questions about the remedial investigation findings, the remedial action; i.e., what
how it would be done, and what effects the action might have. In addition, one qu
addressed purchase of off-Base property. Representatives of the USAF were available
answers to the questions and also provided an overview presentation during the meet
describe the proposed actions.

Part II - Comprehensive Response to Specific Technical, Legal and
Miscellaneous Questions

The comments and questions below have been numbered in the order they appea
written transcript of the September 26, 1995 public meeting.

Comment 1. Jan Deming

OU-1 was Asked about whether the stream running from the northeast to the south
contaminated, or was transporting contaminants.

Response 1: Evidence of jet fuel and pesticides were found in the sediment
drains

were deferred to OU-11 to allow additional investigation of th
conditions on the Base. The ecological assessment showed that
to ecological receptors. The oil/water skimmer in Pond 001 will
contamination floating on the pond surface. The monthly NPDES sa

for a range of chemicals ensures that no contamination is going off-Bas

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Comment 2. Jan Deming

OU-4 area Asked about whether the remedial alternative for off-Base ground water
would include any clean-up of soil in the off-Base area.

Response 2: The remediation in the off-Base area is aimed at ground water.
contamination

was transported off-Base by ground water, and that is what nee
the remedial action.

Comment 3. Willie Kermmoade

Air Force Asked if the property off-Base with contaminated wells will be purchas
or condemned.

Response 3: The Air Force has supplied water from the Rapid City Municipa
Distribution

system to the off-Base properties that border the contaminant pl

4. Remaining Concerns

Based on review of the transcript of the oral comments received during the
meeting, there

are no outstanding issues associated with implementation of the proposed re
action.

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